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The Prevalence and Impact of Post-Traumatic Stress Disorder among Moroccan Adolescents Enrolled in Public High Schools in Salé: a Cross-Sectional Study

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Abstract - Background: Post-traumatic stress disorder (PTSD) is a disorder related to trauma and stress. A survey was conducted to assess the prevalence of PTSD among adolescents enrolled in public high schools in the prefecture of Salé in Morocco. Also assess the impact of this disorder by studying the prevalence of PTSD comorbidities (anxiety and depression). Materials and methods: Ten schools were randomly selected and 500 students were selected using a cross-sectional survey. Five measurement scales in the survey are: A socio-demographic questionnaire, List of stressful events during the adolescent life according to DSM-IV, the Children's Post Traumatic Stress Reaction Index (CPTS-RI), the State Trait Anxiety Inventory Form Y (STAIY) and the Children Depression Inventory (CDI). The survey was carried out from March to June 2017. Cox regression analyzes were performed to investigate independent variables predictors of PTSD. Results: The number of students who completed the study was 348 students aged between 14 and 17 years (16.13 ± 0.81). We found 25.8% of prevalence of PTSD. The factors predictors of PTSD were: gender (hazard ratio (HR) = 1.422, 95% C.I = 1.030 - 1.964, p = 0.033), repetitive dreams (HR = 1.286, 95% C.I = 1.154 - 1.434, p < 0.0001), sleep interrupted (HR = 1.237, 95% C.I = 1.105- 1.386, p < 0.0001), difficulties of memory (HR = 1.134, 95% C.I = 0.996- 1.291, p = 0.050) and difficulties of concentration (HR = 1.135, 95% C.I = 1.010- 1.276, p = 0.034). While for PTSD comorbidities, 81.50% wwere found to have anxiety and 56.67% to have depression. Conclusions: The impact of PTSD is quite remarkable among school-aged adolescents. Therefore, efforts are needed to construct psychological support plans for students in need.

Key words: post-traumatic stress disorder; adolescent; school; anxiety; depression

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Introduction

Post-traumatic stress disorder (PTSD) is a mental health problem that is directly related to the observation or experience of a terrifying event. PTSD designates a disorder related to trauma and stress that can affect anyone and that manifests itself after a lived experience [1]. This experience is often qualified as a traumatic

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event that must cause a threat death, serious injury, threat of danger to the physical integrity of the person himself or of others [2].

Adolescents are vulnerable individuals and particularly sensitive to psychological shocks. They are socially and psychologically less prepared than adults to deal with trauma [3]. Adolescents may over-verbalize dichotomous conversation and somatizations. They can also blame others for the traumatic event [4]. PTSD represents a psychopathological response to a traumatic experience such as violence, accidents, and natural disasters, fatal conditions and other diseases. PTSD is characterized by symptoms such flashbacks of the traumatic event, avoidance, negative cognitions and neurovegetative hyperactivation [1].

An adolescent can be presumed to have PTSD if they face a difficulty overcoming an exposure to a traumatic event even after a month [5]. This happening may interfere with daily life and persists for many years and generally worsens when is not treated. Symptoms of PTSD in adolescents are similar to those that adults experience, which can lead to the disorder having a negative impact on their quality of life resulting in poor school performance, sleep problems and frequent nightmares [6,7]. Another major factor that influences PTSD aggravation in adolescents is the parents' insufficient insight of their children's psychology. Studies investigating PTSD amongst adolescents usually directly interview students at their schools to assess their symptoms of PTSD as there is research that has shown that parents can neglect the symptoms of their children's stress [8-10]. Adolescents avoid talking to their parents about certain traumatic events such as sexual abuse, mainly out of fear, shame and guilt [11]. For different reasons, adolescents prefer to protect their parents from information about the occurrence of a real traumatic impact on them [12]. Having comorbidities of PTSD, primarily anxiety or depressive, influences the intensity and preservation of PTSD symptoms [13,14].

Given the specificity of Moroccan students characterized by poverty and low level of parental education, these criteria present risk factors for developing PTSD. Furthermore, prevalence of PTSD in developing countries like Morocco and absence of medical interventions for school-age adolescents suffering from this disorder presents another challenge. Therefore, it is necessary to prepare a national intervention plan to promote the quality of education.

To the best of our knowledge, no previous study investigating the prevalence of PTSD and comorbidities among school-going adolescents in Morocco has been conducted. However, PTSD can interfere with the daily life of the adolescent in school [7]. Therefore, the prevalence of this disorder should be assessed to support the social and academic life of the student by the Moroccan Ministry of Education and the Ministry of Health. As such, the specific objective of this study was to determine the prevalence of PTSD among adolescents attending public high schools in the Salé prefecture in Morocco as well as the impact of this disorder on their social life and their school career.

Many comorbid conditions can appear following the development of PTSD such as anxiety and depression and compared with adults, young people are more vulnerabile to developing anxiety and depression which might directly and negatively influence on students' school life [7,15,16]. As such, a further aim is to assess the prevalence of anxiety and depression in comorbidity with PTSD.

Subjects and Methods

Population

For this survey, ten high schools were randomly selected and the study was carried out in the prefecture of Salé in Morocco. The sample size was N = 500 adolescents attending secondary school (50 students for each school) and the age of these students varies between 14 and 17 years. The survey was carried

out during the period from March to June 2017 for a cross-sectional study.

Among the 500 students selected, there were 110 adolescents who refused to participate in the study because they had not given their informed consent, so the number of students who were obtained to carry out the survey was 390 hence the participation rate was 78%. After participating in the survey, 42 adolescents were found who did not complete the rest of the questionnaires because they had not experienced any traumatic event in their lives. Thus, the number of students who completed the study until the end was 348 students of both genders distributed as in 140 male students (40.2%) and 208 female students (59.8%).

Data collection and analysis

In order to explain the purpose, the interest and the way of carrying out the investigation, a meeting was carried out with each director of the school individually to explain all the stages of the study at his establishment level, to answer all their questions and to agree on the selection of classes and students who will be chosen for the study. Another meeting was established with the adolescents to explain the course of the study and answer all their questions regarding the survey. A newsletter was distributed to each student explaining the objective of the study and informed consents were given to be signed by their parents or guardians if they agree to participate in the study. After receiving the signed informed consents, two questionnaires were distributed which present a socio-demographic questionnaire and a life events checklist to collect all the data concerning social, demographic information and the life events experienced by each adolescent. During the last meeting, the rest of the data have been collected by administering the following three questionnaires: CPTS-RI, STAIY and CDI. Each questionnaire had been well translated and explained orally to the students. For adolescents who have not suffered any traumatic event, they were exempted from completing the CPTS-RI, STAIY and CDI questionnaires. All questionnaires were completed anonymously and by the adolescents themselves.

Five measurement scales used in the survey were: 1. The socio-demographic data questionnaire; 2. The list of life events which presents the most stressful events during the adolescent life, the list has 17 questions according to DSM-IV [5]; 3. The Children's Post Traumatic Stress Reaction Index (CPTS-RI) questionnaire to assess symptoms of PTSD according to DSM-IV after exposure to a traumatic event [5,17]. It can be used with children and adolescents aged 6 to 16 years and in an estimated duration of 15 to 20 minutes. This questionnaire includes a scale of 20 items rated on a 5-point Likert scale (0 never, 1 almost never, 2 sometimes, 3 often, 4 most often). The final score varies from 0 and 80. A score below 12 indicates absence of PTSD. A score between 12 and 24 indicates a low level of PTSD, between 25 and 39 indicates a moderate level, between 40 and 59 indicates a severe level. A score over 60 indicates a very severe level of PTSD. Fourth instrument used was The State Trait Anxiety Inventory Form Y (STAIY) questionnaire, this questionnaire is intended to assess the intensity of adolescent anxiety and this scale includes 20 items [18]. Each item has a score ranging from 1 to 4 (4 being the strongest degree of anxiety), and is estimated to be completed in a duration of 10 to 15 minutes. The total score varies from 20 to 80. A score less than 35 indicates an absence of anxiety, while a score between 36 and 45 indicates low anxiety, between 46 and 55 indicates medium anxiety, from 56 to 65 indicates upper anxiety, and a score above 65 indicates a very high anxiety. The fifth instrument used was The Children Depression Inventory (CDI) and the purpose of this scale is to assess the intensity of depressed symptoms [17]. It can be used with children and adolescents aged 7 to 17 years, and estimated to be completed in duration of 15 to 20 minutes. The questionnaire includes 27 items. Each item is rated by means of three sentences describing a depressive manifestation (rated on a scale ranging from 0 "absent or normal depressive symptom" to 2 "severe depressive symptom"). The participant must choose the sentence that best corresponds to their condition in the last fifteen days. A total score is calculated by the sum of all the items and it is ranges from 0 to 54. A score less than 15 indicate the absence of depression, and a score equal or greater than 15 indicates the presence of depression.

All statistical analyzes were performed using SPSS version 20 (statistical software). Using descriptive statistical analysis, the data were presented by number of persons and percentage of persons. Continuous variables, like age, were expressed as mean and standard deviation. Univariable and multivariable cox regression analyzes were performed to investigate significant factors predictors with PTSD. Independent variables that were chosen from univariable analysis to multivariable analysis should have a p-value less than 0.1. The confidence interval (CI) was set at 95%. For the values to have been considered significant, it is necessary that $p < 0.05$.

Ethical approval

The research protocol began after receiving a written approval for authorization research from the Ministry of National Education and Scientific Research, Morocco.

Results

Sociodemographic data and lived events

The age of the adolescents was between 14 and 17 years and 75.6% of the students were between 16 and 17 years old. 53% of the boys were 17 years old and 39% of the girls were 16 years old. 2.3% of fathers were unemployed and 80.6% of mothers were unemployed. The average parental salary (father's salary with the mother's salary) was 3.16 ± 1.57dh (Moroccan dirham), which implies that the parents' monthly income was around 4000 dh and 6000 dh per month (for Morocco, the absolute poverty rate was 1.4% and the average salary was 240$ per month and the poverty line was 3834dh). The percentage of students who reported that they were at least exposed to a traumatic event in their lifetime was 89.23% which represented 348 students.

The number of traumatic events experienced by the students was 16 events (Natural disaster; Fire or explosion; Accident of the public way; Serious accident at school or at home; Exposure to a toxic substance; Physical aggression; Hold-up; Sexual assault; Another unwanted and unpleasant sexual experience; Captivity; Illness or life-threatening injury; Intense human suffering; Violent death; Sudden and unexpected death of a loved one; Serious injury, damage or death caused by you to someone; Another very stressful experience) among 17 events. The traumatic event which was not declared was the participation in a combat or a war. The most traumatic event experienced by the students was the sudden and unexpected death of a loved one with 19.5% of the students followed by intense human suffering with 12.4%. The date of the traumatic event was between 1 months and 6 months because the average date of this event was 4.62 ± 1.66 months. Table 1shows the distribution of the number and percentage of students (Table 1).

Table 1. Sociodemographic characteristics of the enrolled participants

Variable	Number (%)
Age (years)	
14	5 (1.4)
15	80 (23)
16	129 (37.1)
17	134 (38.5)
Gender	
Male	140 (40.2)
Female	208 (59.8)
Marital status of parents	
Married	302 (86.8)
Divorced	15 (4.3)
Death of one of the parents	31 (8.9)
Father works	340 (97.7)
Mother works	66 (19.4)
Salary	
Under 4000dh	138 (39.6)
Between 4000 - 8000dh	120 (34.5)
More than 8000dh	90 (25.9)
Tobacco use	78 (22.4)
Traumatic event	
The sudden and unexpected death of a loved one	68 (19.5)
Date of event	
Between 1 month and 6 months	100 (28.8)
Between 6 months and 1 year	50 (14.4)
Between 1 year and 3 years	95 (27.3)
More than 3 years	103 (29.6)

Prevalence of PTSD and its associated disorders

By analyzing the items on the CPTS-RI scale, those that were most marked in students who presented with post traumatic stress disor-

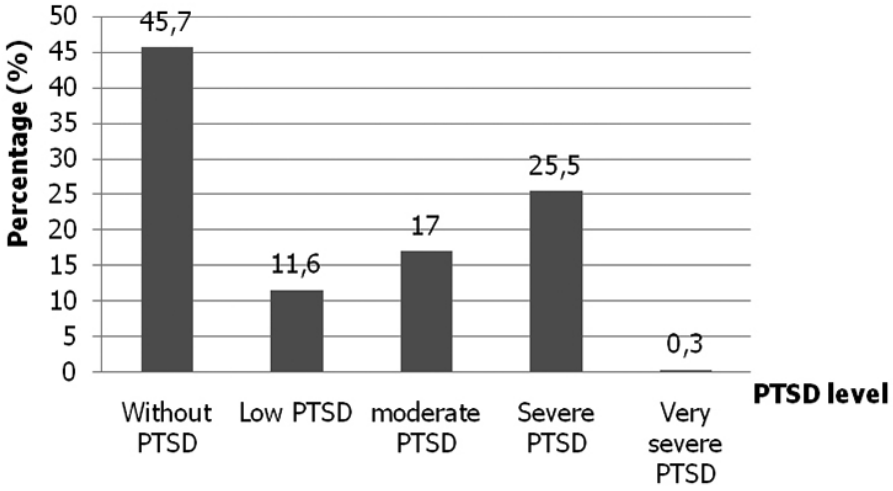

Figure 1. The severity level of post-traumatic stress disorder (PTSD)

der, 66.7% founded who demonstrated symptoms of social avoidance, 56.6% of symptoms of feelings of detachment, 55.0% of the symptoms of overwhelming memories, 52.9% of the symptoms of guilt and 49.7% of the symptoms of sentimental avoidance. Figure 1 shows the percentage of severity level of post traumatic stress disorder. For the sample of 348 students, 25.8% of adolescents (n = 90) who had PTSD. The adolescents who did not have PTSD were 74.2% (n = 258) (Figure 1). For the gender difference, it was found 15 boys with PTSD (16.7%) and 75 girls with PTSD (83.3%). Figure 2 shows the percentage of anxiety and depression in adolescents with PTSD. While for comorbid PTSD, it was found 81.1% (n = 73) with anxiety and 56.6% (n = 51) with depression (Figure 2). For the group with PTSD, it

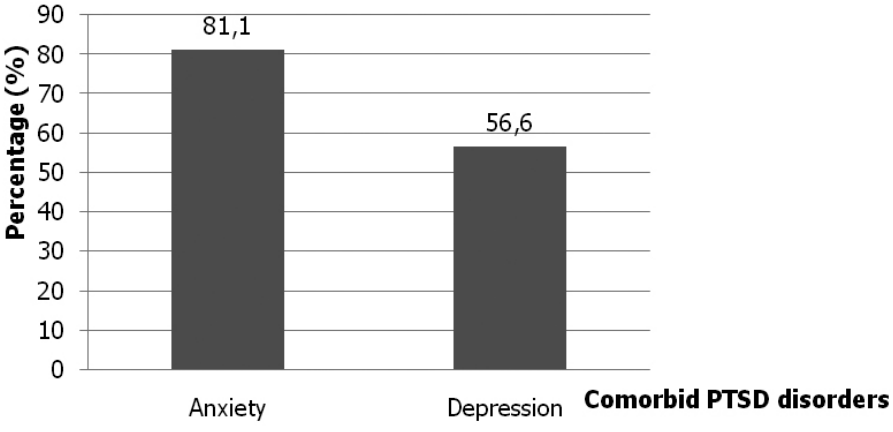

Figure 2. Comorbid anxiety and depression in adolescents with PTSD

Table 2. Univariable and multivariable predictors of Post-traumatic Stress Disorder (PTSD)

Variable	Univariable Analysis		Multivariable Analysis	
	HR (95% CI)	p	HR (95% CI)	p
Age (years)				
17 (ref)				
14	2.616 (0.950 - 7.209)	0.063		
15	1.242 (0.864 - 1.784)	0.241		
16	1.064 (0.757 - 1.494)	0.722		
Gender				
Male (ref)				
Female	1.734 (1.260 - 2.387)	0.001	1.422 (1.030 - 1.964)	0.033
Marital status of parents				
Married (ref)				
Divorced	0.857 (0.452 - 1.624)	0.636		
Death of one of the parents	0.525 (0.268 - 1.029)	0.061		
Salary (dh)				
Above 8000 (ref)				
Between 4000-8000	1.236 (0.698 - 2.186)	0.467		
Below 4000	0.993 (0.502 - 1.965)	0.984		

was found 55.5% of girls (n = 50) with anxiety, while 25.6% of boys (n = 23) with anxiety and 41.1% of girls (n = 37) with depression, while 15.5% of boys (n = 14) with depression.

Predictors of PTSD

Table 2 shows univariable and multivariable predictors of post traumatic stress disorder (PTSD). Gender predicts the onset of symptoms of PTSD; girls were more at risk of developing PTSD than boys (HR = 1.422, 95% CI = 1.030-1.964, p = 0.033). Repetitive dreams about the event (HR = 1.286, 95% CI = 1.154 - 1.434, p < 0.0001), sleep interrupted because of the thought of the event (HR = 1.237, 95% CI = 1.105 - 1.386, p < 0.0001), difficulties of memory because of the event (HR = 1.134, 95% CI = 0.996 - 1.291, p = 0.050), difficulties of concentration because of the event (HR = 1.135, 95% CI = 1.010 - 1.276, p = 0.034), and regression (do things that we had stopped doing before the event, for example: wanting to have someone always nearby, not wanting to sleep alone, suck the thumb or fingers, bite the nails or wet the bed; HR = 1.117, 95% CI = 1.002 - 1.244, p = 0.046) were the variables that predicted the onset of PTSD (statistically significant) (Table 2). There was an impact of PTSD on the daily life of the students; the adolescents who wanted to commit suicide were 8.8%. It was found 18.9% of the adolescents who use illicit drug and 72.2% of the students who had poor school results. The students who repeat the school class were 29.1%.

Discussion

In this study, the objective was to investigate the prevalence of PTSD and the prevalence of PTSD comorbidities (anxiety and depression) among students from 10 public

Table 2. (continued)

Variable	Univariable Analysis		Multivariable Analysis	
	HR (95% CI)	p	HR (95% CI)	p
Tobacco use				
No (ref)				
Yes	0.846 (0.591 - 1.213)	0.364		
Repetitive Dreams				
No (ref)				
Yes	1.372 (1.242 - 1.517)	< 0.0001	1.286 (1.154 - 1.434)	< 0.0001
Sleep interrupted				
No (ref)				
Yes	1.281 (1.151 - 1.425)	< 0.0001	1.237 (1.105 - 1.386)	< 0.0001
Difficulties of memory				
No (ref)				
Yes	1.207 (1.058 - 1.377)	0.005	1.134 (0.996 - 1.291)	0.050
Difficulties of concentration				
No (ref)				
Yes	1.298 (1.172 - 1.438)	< 0.0001	1.135 (1.010 - 1.276)	0.034
Regression				
No (ref)				
Yes	1.238 (1.120 - 1.367)	< 0.0001	1.117 (1.002 - 1.244)	0.046

high schools in the prefecture of Salé, Morocco.

In the current study 25.8% of students reported suffering from clinically relevant PTSD, of which 83.3% were girl while 16.7% were male. Among students who had PTSD, there was 81.1% of anxiety and 56.6% of depression. In addition, 72.22% with PTSD were found to have poor academic performance.

According to some studies, boys experience more traumatic events than girls, but girls can develop more symptoms of PTSD than boys [19]. Studies addressing PTSD have focused more on adults than adolescents [20-22]. However, numbers of studies focusing on adolescents have been increasing over the last few years and have found that there is a great resemblance between PTSD symptoms in adolescents and adults, with few specific differences in psychology in adolescents. According to diverse studies, adolescents experience more traumatic events compared to adults, due to causes related to psychological and social characteristics of adolescents [3]. Prevalence of adolescent exposure to traumatic events was found to be around 40% to 90%, and even close to 100% [23,24]. Which is in accordance with the survey results. 89.23% of adolescents participating in the study reported being exposed to traumatic events. The most experienced traumatic event was being sudden and unexpected death of a loved one, which also in accordance with findings from other studies [24].

Compared to adults, the percentage of developing PTSD in adolescents had upmost and the prevalence can range from 5 to 90% and this difference in prevalence had due to

some factors such as age, type of trauma, PTSD metrics, culture, country of investigation, population, and other factors [25-29].

The most observed PTSD comorbidities are anxiety and depression. These comorbidities influence the intensity of PTSD maintenance and the symptomatology of PTSD. The presence of the high prevalence of PTSD and the high prevalence of PTSD comorbidities, adolescents are more vulnerable to anxiety and depression [30-32]. Several studies indicate that girls may have more symptoms of PTSD and PTSD comorbidities (anxiety and depression) than boys [33]. Indeed, in the current study, girls presented more of these comorbidities than boys.

PTSD has a major influence on the well-being of adolescents because the symptoms of this disorder could persist for many years and worsen if left untreated [34]. The results of the survey must be taken into consideration by local authorities to improve the quality of life of these schoolchildren and it was strongly recommended to set up a support program at school level by psychologists to cure PTSD and there are implications that needed by reliable treatments.

Many studies discuss the school and academic problems among adolescents after a traumatic event. Adolescents manifest attention and concentration deficits and memory problems [35]. There is also poor performance and academic results [36]. Therefore, school-aged adolescents with PTSD may experience serious academic performance problems and poor academic performance which may increase the risk of repeating grades. Regarding the study data for students with PTSD, 63.50% had difficult to concentrate, 14.82% had difficult to remember things that learned at school and 68.25% were not doing their homework. This is how it has been indirectly explained the high rate of poor academic performance among adolescents. Several studies show that among the serious consequences of PTSD are suicidal thoughts [37]. For the abuse of psychoactive substances among adolescents at school, in the survey, it was found in the students 19.6% who use tobacco and 18.9% of the adolescents who use illicit drug [37,38].

During the time the current study was conducted, there were very few studies conducted in Morocco investigating PTSD, and no studies addressing high school students, which present a major gap for the literature addressing the prevalence of PTSD and the prevalence of PTSD comorbidities. For this reason, this investigation could present a great added value to the literature. Results of this study could be used by governmental and private organizations to set up a support project for adolescents with psychological difficulties, to avoid the negative impact of PTSD on high schoolers and improve their academic results, which present a great national problem.

The biggest problem for this study was the lack of financial support as the sample of students might be larger. The participation rate in this study may have been higher but there was no encouragement to participate due to the low awareness of parents, the elderly and institutions to the mental difficulties of children and adolescents. Some students were not present for the first meeting because they were not informed by their directors. This complicated the intervention tasks and caused a waste of time. Also, even more effort on the part of the investigator because it was must to replace the students by others. The use of a self-administered method rather than an assessment by a clinician with a well-established structured clinical interview was another limitation for the measurement of PTSD. Also, the CPTS-RI scale was in Arabic but the STAIY and CDI measurement scales were in French, which take more time to explain the items on each scale to them.

This study investigated prevalence of PTSD and the prevalence of PTSD comorbidities (anxiety and depression) among students of high school in Morocco. A high prevalence of PTSD was identified, reaching a prevalence of 25.8% among students. In addition, a significantly high prevalence of anxiety and depression was identified amongst students with this disorder.

Adolescence is a critical period with considerable risk of exposure to stressful events. PTSD can severely impact the adolescents' quality of life, and their academic and performance levels, a support plan for adolescents with psychological issues including PTSD should be put in place in the institutions of education. Therefore, it is necessary to establish an action plan to promote the quality of life at the psychological and educational level by the national institutions concerned. To treat PTSD and achieve partial or total remission, there are several effective treatments.

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Conflict of interest

None to declare.

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Prevalencija i utjecaj posttraumatskog stresnog poremećaja među marokanskim adolescentima upisanima u državne srednje škole u Saléu: presječna studija

Sažetak - Cilj: Posttraumatski stresni poremećaj (PTSP) je poremećaj povezan s traumom i stresom. Provedeno je istraživanje kako bi se procijenila prevalencija PTSP-a među adolescentima upisanim u javne srednje škole u prefekturi Salé u Maroku. Također je procjenjivan utjecaj ovog poremećaja proučavanjem prevalencije komorbiditeta PTSP-a (anksioznost i depresija). Materijali i metode: Slučajno je odabrano deset škola, a anketom poprečnog presjeka odabrano je 500 učenika. Pet mjernih ljestvica u istraživanju su: sociodemografski upitnik, popis stresnih događaja tijekom adolescentnog života prema DSM-IV, indeks dječje posttraumatske reakcije na stres (CPTS-RI), Obrazac za inventar stanja anksioznosti stanja Y (STAIY) i Inventar dječje depresije (CDI). Istraživanje je provedeno od ožujka do lipnja 2017. Provedene su Coxove regresijske analize kako bi se istražilo neovisne varijable prediktore PTSP-a. Rezultati: Broj studenata koji su završili studij je 348 studenata u dobi od 14 do 17 godina (16,1 ± 0,8). Utvrdili smo 25,8% prevalencije PTSP-a. Čimbenici koji predviđaju PTSP bio je spol (omjer opasnosti (HR) = 1,422, 95% CI = 1,030 - 1,964, p = 0,033), ponavljajući snovi (HR = 1,286, 95% CI = 1,154 - 1,434, p < 0,0001), prekinut san (HR = 1,237, 95% CI = 1,105 - 1,386, p < 0,0001), poteškoće pamćenja (HR = 1,134, 95% CI = 0,996 - 1,291, p = 0,050) i poteškoće koncentracije (HR = 1,135, 95% CI = 1,010 - 1,276, p = 0,034). Dok je za komorbiditete PTSP-a utvrđeno da 81,5% ima anksioznost, a 56,7% depresiju. Zaključak: Utjecaj PTPS-a prilično je značajan među adolescentima školske dobi. Stoga su potrebni napori u izradi planova psihološke podrške studentima u potrebi.

Ključne riječi: posttraumatski stresni poremećaj; adolescent; škola; anksioznost; depresija